

WHAT IS CLAIMED IS:

1. A minimally-invasive method of implanting a valve prosthesis device within an existing vein of a human to restore venous valvular function within the vein, the valve prosthesis device adapted to press outward against the inner walls of the vein to hold the valve prosthesis device in position within the vein following implantation, the method comprising the steps of:

positioning the valve prosthesis device within a hollow distal portion of an introducer with the valve prosthesis device in a compressed state;

advancing the hollow distal portion of the introducer, with the valve prosthesis device positioned therein, into the vein of the human through an opening in a wall of the vein; and

expelling the valve prosthesis device from the distal portion into the vein to cause the device to expand to an operational state in which the valve prosthesis device is maintained in position within the vein by pressing outward against the inner walls of the vein.

2. The method of Claim 1, wherein the step of expelling comprises slidably advancing an expulsion member distally to forcibly displace the valve prosthesis device from the distal portion of the introducer.

3. The method of Claim 1, wherein the valve prosthesis device comprises a generally flat, resilient frame which is rollable upon itself to place the frame in a tubular configuration, and wherein the step of positioning comprises rolling the frame against a biasing force to place the valve prosthesis device in a radially-compressed configuration that corresponds to an inner diameter of the hollow distal portion of the introducer.

4. A method for regulating the flow of blood in a blood vessel through an implantable venous valve prosthesis device having a proximal end and a distal end, the method comprising:

directing a pulse of blood through the distal end of the prosthesis device and out the proximal end;

opening a temporary blood storage area having inner and outer walls within the prosthesis device to prevent the pulse of blood from flowing back through the distal end of the device; and

storing any back-flowing blood within the temporary blood storage area between the inner and outer walls.

5. The method of Claim 4, further comprising closing the temporary blood storage area and forcing the blood stored therein out of the storage area and out of the proximal end of the device upon the passage of a subsequent pulse of blood through the distal end of the prosthesis device and out the proximal end.

6. The method of Claim 4, wherein the temporary blood storage area comprises at least one pocket having an opening adjacent the proximal end of the device.

7. The method of Claim 6, wherein the temporary blood storage area comprises three pockets arranged substantially circumferentially within the device.

8. The method of Claim 7, wherein directing the pulse of blood through the device comprises directing the pulse of blood between the pockets.